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# A New Combination in *Spiraea* (Rosaceae) from Ulleung Island, Korea

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**ABSTRACT.** A rare endemic species on Ulleung Island, Korea, is transferred from *Physocarpus* (Cambess.) Raf. (Rosaceae) to *Spiraea* L., based on morphology and DNA sequence data. The new combination *S. insularis* (Nakai) H. Shin, Y. D. Kim & S. H. Oh is proposed.

**Key words:** Korea, *Physocarpus*, Rosaceae, *Spiraea*, Ulleung Island.

*Physocarpus* (Cambess.) Raf. is a small genus with about six species in Rosaceae (Oh & Potter, 2005). The genus, which is distributed in East Asia and North America, is characterized by having stipulate simple leaves, fused carpels at least at the base, inflated follicular fruits dehiscent along both the ventral and dorsal sutures, copious endosperm, and stellate trichomes. North America has the greatest diversity with four species in western North America and one in eastern North America: the eastern North American *P. opulifolius* (L.) Maxim. is widely cultivated as an ornamental. In East Asia, *P. amurensis* (Maxim.) Maxim. occurs in thickets in mixed coniferous forests of North Korea, northeastern China, and the Far Eastern Federal District of Russia.

*Physocarpus insularis* (Nakai) Nakai has been known as a rare species in East Asia (Nakai, 1918) and is endemic on Ulleung Island. This very small volcanic island is located in the East Sea of Korea (Sea of Japan) about 150 km east of the Korean Peninsula with an area of about 73 km<sup>2</sup> and a maximum elevation of 984 m above sea level. The vegetation on this island is primarily temperate broadleaf deciduous forest often mixed with conifers and evergreen shrubs. It is a biodiversity hotspot with approximately 700 species of vascular plants, 41 of

which are endemic on the island (Sun & Stuessy, 1998).

Classification of *Physocarpus insularis* has been problematic, however. The insular species was synonymized under *Spiraea chamaedryfolia* L. var. *ulmifolia* (Scop.) Maxim. by Kim et al. (2000), whereas all floristic studies of Korea recognized it as a distinct species in *Physocarpus* (Chung, 1957; Lee, 1980; Lee, 2007). As part of our systematic studies of vascular plants on Ulleung Island, we examined the systematics of *P. insularis* based on morphology and DNA sequences (Oh et al., 2010).

The results suggested that *Physocarpus insularis* should be recognized as a distinct taxon within *Spiraea* L. (Oh et al., 2010). Comparative morphology revealed that *P. insularis* exhibits all the diagnostic characters of *Spiraea*. Leaves are unlobed and do not have stipules. Nectaries form conspicuous lobes at the rim of the hypanthium. Carpels are free, and the follicular fruits dehisce along the ventral suture only. Phylogenetic analyses of chloroplast DNA (cpDNA) regions (*rbcL*, *matK*, *ndhF*, and *trnL-trnF*) with exemplars representing major lineages of Rosaceae confirmed that our accession identified as *P. insularis* is nested within *Spiraea*. Further phylogenetic analyses of *trnL-trnF* and ITS data with additional species-level samples of *Spiraea* suggested that *P. insularis* is closely related to *S. chamaedryfolia*, a taxon distributed from Europe to East Asia.

*Physocarpus insularis* is readily distinguished from *Spiraea chamaedryfolia* by the size and shape of the leaf blade, the type of leaf base, and the number of stamens. The length and width of leaf blades of *P. insularis* are significantly larger than those of *S. chamaedryfolia*. Leaf blades of *P. insularis* are broadly ovate and subcordate, truncate, or occasion-

ally rounded at the base, while those of *S. chamaedryfolia* are narrowly ovate or elliptical and briefly attenuate or rounded at the base. The ratio of leaf length to width ranges from 1.09 to 1.50 in *P. insularis*, while the ratio in *S. chamaedryfolia* ranges from 1.45 to 2.38, reflecting the different leaf shapes of the two species. *Physocarpus insularis* has a higher stamen number, with 60 to 70 stamens per flower, than observed for *S. chamaedryfolia*, which contains 20 to 50 stamens per flower.

***Spiraea insularis*** (Nakai) H. Shin, Y. D. Kim & S. H. Oh, comb. nov. Basionym: *Opulaster insularis* Nakai, Bot. Mag. (Tokyo) 32: 104. 1918. *Physocarpus insularis* (Nakai) Nakai, Bull. Natl. Sci. Mus. Tokyo 31: 56. 1952. TYPE: Korea. Kyungsangbuk-do, Ulleung Island, Do-dong, 1 June 1917, T. Nakai 4344 (holotype, TI).

**Discussion.** This species was originally described in the genus *Opulaster* Medik. ex C. K. Schneid. (Nakai, 1918) and later transferred to *Physocarpus* (Nakai, 1952), an earlier name that has priority over the illegitimate name *Opulaster*. The holotype specimen as noted by Nakai for *O. insularis* contains only sterile branches without flowering or fruiting material. Nakai (1919) noted that the leaves were similar to those of the western North American *P. monogynus* (Torr.) J. M. Coult. However, the diagnostic characters of *Physocarpus*, such as stipules and stellate hairs, are absent in the holotype specimen.

*Spiraea insularis* is a shrub ca. 1 m tall, known primarily from the west-facing hills near the port of Do-dong on Ulleung Island. Most individuals in the population grow on the rocky slopes at about 200 m elevation, associated with *Abelia insularis* Nakai and *Cotoneaster wilsonii* Nakai. The natural habitat of these endangered species in the Do-dong area has been designated as a Natural Monument in Korea. Because most plants of *S. insularis* grow within the

protected area, it is unlikely that the population of *S. insularis* will be disturbed by anthropogenic activities. However, because the slopes are very steep, the plant community is vulnerable to soil erosion especially due to typhoons.

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